

AMENDMENT TO THE CLAIMS

1. to 30. (Canceled)

31. (Currently Amended) A method of detecting a face in a color digital image formed of a plurality of pixels, said method comprising the steps of:

selecting a color distribution model from a plurality of color distribution models, the selection being dependent on at least one image capture condition provided with the color digital image;

B1 testing the color of the plurality of pixels to determine those pixels having predominantly skin color, the testing utilizing ~~at least one image capture condition provided with the color digital image~~ the selected color distribution model; and

subjecting only those pixels determined in said testing step as having predominantly skin color to further facial feature analysis whereby those pixels not having a predominantly skin color are not subjected to the further facial feature analysis.

32. (Previously Presented) A method according to claim 31, wherein the at least one image capture condition is acquired at a time the color digital image is captured.

33. (Previously Presented) A method according to claim 32, wherein the color digital image is encoded according to a predetermined format and the at least one image capture condition is represented as meta-data associated with the predetermined format.

34. (Previously Presented) A method according to claim 31 wherein the at least one image capture condition comprises lighting conditions at a time the color digital image was captured.

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35. (Previously Presented) A method according to claim 31, wherein said testing step comprises the sub-step, preceding the testing, of dividing the color digital image into a plurality of regions, each region comprising a plurality of pixels,

wherein the testing is performed on pixels within each region to determine those ones of the plurality of regions that are predominantly skin color, and said subjecting step comprises performing the further facial feature analysis on only those regions determined to be predominantly of skin color.

36. (Currently Amended) A method according to claim 31, wherein ~~said testing step utilizes at least one predetermined color distribution model~~, the selected color distribution model ~~having~~ has been generated using previously sampled facial image data.

37. (Previously Presented) A method according to claim 36, wherein the color distribution model is generated for a particular image capture device.

38. (Previously Presented) A method according to claim 36, wherein separate color distribution models are generated for different image capture conditions.

39. (Previously Presented) A method according to claim 38, wherein the at least one image capture condition comprises lighting conditions at a time the color digital image was captured and separate color models are generated for different lighting conditions at a time the previously sampled facial image data was captured.

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40. (Previously Presented) A method according to claim 39, wherein separate color distribution models are generated for groups of images taken with a flash and images taken without a flash.

41. (Previously Presented) A method according to claim 39, wherein separate color distribution models are generated for groups of images taken indoors and images taken outdoors.

42. (Previously Presented) A method according to claim 36, wherein each color distribution model is represented as a frequency histogram of color representation vectors.

43. (Previously Presented) A method according to claim 36, wherein each color distribution model is represented as a probability distribution of color representation vectors.

44. (Previously Presented) A method according to claim 36, wherein each color distribution model is represented as a binary map of color representation vectors.

45. (Previously Presented) A method according to claim 42, 43 or 44, wherein the color representation vectors are derived from perceptual color space values of predetermined skin-color pixels in the previously sampled facial image data.

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46. (Previously Presented) A method according to claim 42, 43 or 44, wherein color representation vectors contain chromatic color values derived from those RGB values of predetermined skin-color pixels in the previously sampled facial image data.

47. (Previously Presented) A method according to claim 44, wherein the binary map comprises a percentage of the skin color pixels that were identified in the previously sampled facial image data.

48. (Previously Presented) A method according to claim 47, wherein one of the plurality of pixels is classified as being skin color if the color representation vector corresponding thereto occurs within the binary map.

49. (Previously Presented) A method according to claim 42, wherein each of the plurality of pixels is classified as being skin color if the frequency of the color representation vector corresponding thereto exceeds a predetermined threshold frequency.

50. (Previously Presented) A method according to claim 43, wherein each of the plurality of pixels is classified as being skin color if the probability of the color representation vector corresponding thereto exceeds a predetermined probability threshold.

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51. (Previously Presented) A method according to claim 35, wherein one of the plurality of regions is determined to be predominantly skin color if more than a predetermined percentage of the total number of pixels in the one region are classified as being skin color.

52. (Previously Presented) A method according to claim 35, wherein the plurality of regions are geometrically divided from the color digital image.

53. (Previously Presented) A method according to claim 35, wherein the plurality of regions are formed of pixels having substantially homogenous color.

54. (Previously Presented) A method according to claim 53, wherein the plurality of regions are formed using a region growing method based upon color differences.

55. (Previously Presented) A method according to claim 35, wherein said subjecting step is independent of face color.

56. (Currently Amended) An apparatus for detecting a face in a color digital image formed of a plurality of pixels, said apparatus comprising:

means for selecting a color distribution model from a plurality of color distribution models, the selection being dependent on at least one image capture condition provided with the color digital image;

B/ means for testing the color of the plurality of pixels to determine those pixels having predominantly skin color, said testing means utilizing ~~at least one image capture condition provided with the color digital image~~ the selected color distribution model; and

means for subjecting only those pixels so determined as having predominantly skin color to further facial feature analysis whereby those pixels not having a predominantly skin color are not subjected to the further facial feature analysis.

57. (Previously Presented) An apparatus according to claim 56, wherein the at least one image capture condition is acquired at a time the color digital image is captured.

58. (Previously Presented) An apparatus according to claim 57, wherein the color digital image is encoded according to a predetermined format and the at least one image capture condition is represented as meta-data associated with the predetermined format.

59. (Previously Presented) An apparatus according to claim 56, wherein the at least one image capture condition comprises lighting conditions at a time the color digital image was captured.

60. (Previously Presented) An apparatus according to claim 56, wherein said means for testing comprises means for dividing the color digital image into a plurality of regions, each region comprising a plurality of pixels,

B1 wherein said means for testing operates on pixels within each region to determine those ones of the plurality of regions that are predominantly skin color and said means for subjecting causes the further facial feature analysis to be performed on only those regions determined to be predominantly of skin color.

61. (Currently Amended) A computer readable medium incorporating a computer program product for detecting a face in a color digital image formed of a plurality of pixels, said computer program product comprising ~~code for~~:

code for selecting a color distribution model from a plurality of color distribution models, the selection being dependent on at least one image capture condition provided with the color digital image;

code for testing the color of the plurality of pixels to determine those pixels having predominantly skin color, the testing utilizing ~~at least one image capture condition provided with the color digital image~~ the selected color distribution model; and

code for subjecting only those pixels so determined as having predominantly skin color to further facial feature analysis whereby those pixels not having a predominantly skin color are not subjected to the further facial feature analysis.

62. (Previously Presented) A computer readable medium according to claim 61, wherein the at least one image capture condition is acquired at a time the color digital image is captured.

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63. (Previously Presented) A computer readable medium according to claim 62, wherein the color digital image is encoded according to a predetermined format and the at least one image capture condition is represented as meta-data associated with the predetermined format.

64. (Previously Presented) A computer readable medium according to claim 61, wherein the at least one image capture condition comprises lighting conditions at a time the color digital image was captured.

65. (Previously Presented) A computer readable medium according to claim 61, wherein said code for testing comprises code for dividing the color digital image into a plurality of regions, each region comprising a plurality of pixels,

wherein said code for testing operates on pixels within each region to determine those ones of the plurality of regions that are predominantly skin color, and said

code for subjecting causes the further facial feature analysis to be performed on only those regions determined to be predominantly of skin color.

66. (New) A method according to claim 31, wherein said testing step utilizes at least one threshold for determining whether a pixel has predominantly skin color, the threshold selected using the at least one image capture condition.

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67. (New) A method of detecting a face in a color digital image formed of a plurality of pixels, said method comprising the steps of:

testing the color of the plurality of pixels to determine those pixels having predominantly skin color, the testing utilizing at least one threshold dependent on at least one image capture condition provided with the color digital image; and

subjecting only those pixels determined in said testing step as having predominantly skin color to further facial feature analysis whereby those pixels not having a predominantly skin color are not subjected to the further facial feature analysis.

68. (New) A method of detecting a face in a color digital image formed of a plurality of pixels, said method comprising the steps of:

selecting a threshold from a plurality of thresholds, the selection being dependent on at least one image capture condition provided with the color digital image;

testing the color of the plurality of pixels to determine those pixels having predominantly skin color, the testing utilizing the selected threshold; and

subjecting those pixels determined in said testing step as having predominantly skin color to further facial feature analysis.

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69. (New) A computer readable medium incorporating a computer program product for detecting a face in a color digital image formed of a plurality of pixels, said computer program product comprising:

code for selecting a threshold from a plurality of thresholds, the selection being dependent on at least one image capture condition provided with the color digital image;

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code for testing the color of the plurality of pixels to determine those pixels having predominantly skin color, the testing utilizing the selected threshold; and

code for subjecting those pixels so determined as having predominantly skin color to further facial feature analysis.
